

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see Form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see Form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/FR2004/001313

International filing date (day/month/year)
27.05.2004

Priority date (day/month/year)
28.05.2003

International Patent Classification (IPC) or both national classification and IPC
F02K7/06, F02B71/06

Applicant
MBDA FRANCE

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1 (a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires earlier.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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Box No. I. Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed
☐ filed together with the international application in computer readable form
☐ furnished subsequently to this Authority for the purposes of search
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. II. Priority

1. ☒ The following document has not yet been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rules 43*bis*.1 and 66.7(a)).
☐ translation of the earlier application whose priority has been claimed (Rules 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	1-12
	No: Claims	
Inventive Step	Yes: Claims	1-12
	No: Claims	
Industrial Applicability	Yes: Claims	1-12
	No: Claims	

2. Citations and explanations:

see separate sheet

CONCERNING POINT V.

1. Reference is made to the following documents in the present notification:

D1: DE 947 655 C (SCHMIDT PAUL) 23 August 1956 (1956-08-23)

D2: US 2002/139106 A1 (MEHOLIC GREGORY VINCENT) 3 October
2002 (2002-10-03)

- 2.1 Document D1, which is regarded as representing the most relevant state of the art, describes (the references between brackets apply to this document):

A pulse-detonation engine ("Strahltriebwerk", Fig. 3, 9-11) fed cyclically with a combustible charge introduced into the combustion chamber of a flame tube (1, 36, 39, 52) with transverse end (2, 30, 42, 53) by a feed device; said transverse end of the flame tube is mounted moveably with respect to the latter so as to be able to occupy two limit positions, a first position corresponding to the phase of detonation of the combustible charge in the combustion chamber of said tube and a second position corresponding to the phase of feeding of the combustible charge into said chamber; in the lateral wall of said tube, at least two openings (40) for feeding said combustible charge are provided, which are blanked off and separated from said combustion chamber by said moveable end (2, 30, 42, 53), when the latter occupies its first position, and which are in fluid communication with said chamber, when said moveable end occupies its second position.

The subject matter of the independent claim 1 differs in that: in **said first position**, said moveable transverse end is secured to said tube by releasable locking means.

- 2.2 Document D2, which is regarded likewise as representing the most relevant state of the art, describes (the references between brackets apply to this document):

A pulse-detonation engine (10) fed cyclically with a combustible charge introduced into the combustion chamber (14) of a flame tube (12) with transverse end (34) by a feed device; said transverse end of the flame tube is mounted rotatably with respect to the latter so as to be able to occupy two positions, a first position corresponding to the phase of detonation of the combustible charge in the combustion chamber (14) of said tube (12) and a second position corresponding to the phase of feeding of the combustible charge into said chamber (14); in the lateral wall of said tube, at least two openings (56) for feeding said combustible charge are provided, which are blanked off and separated from said combustion chamber by said rotatable end (34), when the latter occupies its first position, and which are in fluid communication with said chamber, when said moveable end occupies its second position.

The subject matter of the independent claim 1 differs in that: in **said first position**, said moveable transverse end is secured to said tube by releasable locking means.

- 3.1 The subject matter of claim 1 is therefore novel (article 33(2)PCT). The problem to be solved by the present invention may be regarded as: the increasing of the efficiency of the engine by preventing the premature opening of the combustion charge feed openings.
- 3.2 This problem's solution proposed in claim 1 of the present application is regarded as involving an inventive step (article 33(3)PCT), this being for the following reasons: None of the documents cited in the search report shows or suggests the securing of the moveable transverse end to the flame tube in **said first position** by releasable locking means. It does not appear possible to arrive at the combination of the characteristics as is proposed in claim 1 without an inventive step.
- 3.3 Claims 2-12 depend on claim 1 and therefore also satisfy, as they stand, the conditions required by the PCT as regards novelty and inventive step.